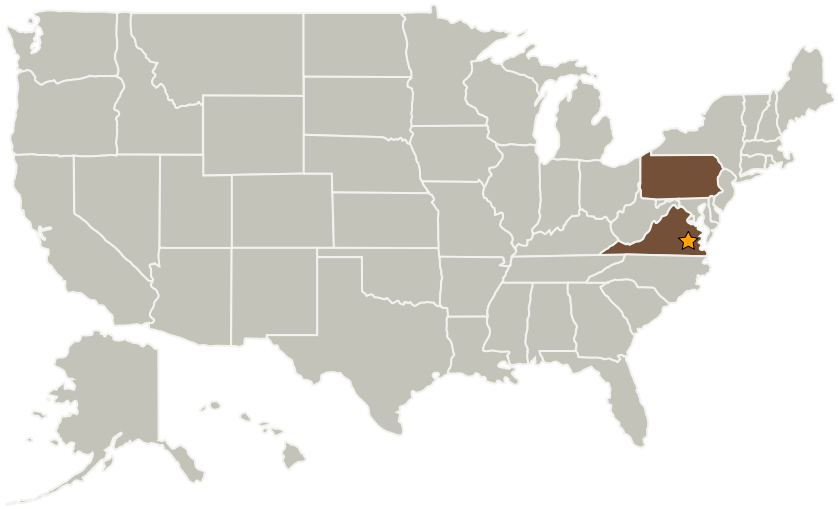
Advanced Electroactive Single Crystal and Polymer Actuator Concepts for Passive Optics, Phase I

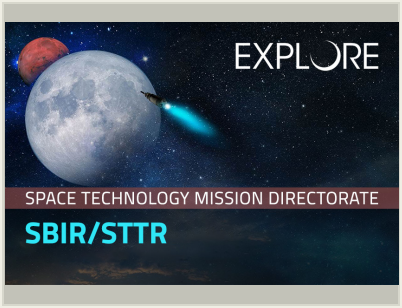
Completed Technology Project (2005 - 2005)

Project Introduction

TRS Technologies proposes large stroke and high precision piezoelectric single crystal and electroactive polymer actuator concepts?HYBrid Actuation System (HYBAS) for cryogenic passive optics devices such as Fabry-Perot interferometer and Fourier Transform Spectrometer for NASA remote sensing applications. Both single crystal piezoelectrics (PMN-PT and PZT-PT crystals) and electro-active polymer (EAP) are well known novel materials with large strain under electric activation. TRS has lead the development of single crystal actuators for applications with broad temperature range (<20K-300K). The National Institute of Aerospace has been extensively involved in electroactive polymer materials and device development and they recently invented the hybrid actuation system (HYBAS) which exhibits significant strain improvement by combining single crystal piezoelectrics and EAP. HYBAS actuator design considering special properties of single crystal with different crystal cut will be carried out using both analytical and FEM modeling. A HYBAS actuator with stroke of 1~2 mm will be prototyped and tested with and without pre-loading. The characterization data of HYBAS will be compared with the performance of the existing TRS actuators for consideration in Phase II etalon designs. In Phase II cryogenic etalons using HYBAS and/or other TRS cryogenic actuators will be designed, prototyped and characterized.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
TRS Ceramics, Inc.	Supporting Organization	Industry	State College, Pennsylvania

Primary U.S. Work Locations	
Pennsylvania	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul Rehrig

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.3 Mechanical Systems
    - TX12.3.7 Mechanism Life Extension Systems